LENSED FIBER FOR OPTICAL INTERCONNECTIONS

Cross-Reference to Related Applications

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[0001] This application is a continuation-in-part of U.S. Patent Application Serial No. 10/319,748, entitled "Lensed Fiber for Optical Interconnections," filed December 13, 2002, now abandoned. This applications claims priority to U.S. Provisional Application 60/486,087, entitled "Lensed Fiber for Optical Interconnections," filed July 9, 2003.

Background of Invention

[0002] The invention relates generally to optical interconnections. More specifically, the invention relates to a lensed fiber capable of refracting light coming into and out of an optical fiber into a collimated or focused beam and to a method of making the lensed fiber.

[0003] A lensed fiber is a monolithic device having an optical fiber that is terminated with a lens. Lensed fibers are advantageous because they do not require active alignment and bonding of the optical fiber to the lens, they have low insertion loss, and they enable component miniaturization and design flexibility. Lensed fibers are easily arrayed and are therefore desirable for making arrayed devices such as variable optical attenuators and optical isolators, for use in silicon optical bench applications, for use as high power connectors and dissimilar fiber connectors, and for coupling optical signals into other micro-optic devices. In addition, the spot size and working distance of a lensed fiber can be tailored for a specific application. For example, the spot size and working distance of a lensed fiber can be tailored to produce the smaller beam diameters that can allow use of smaller micro-electro-mechanical systems (MEMS) mirrors in optical switches.

[0004] Figure 1A shows a prior-art lensed fiber **100** having a lens **102** spliced to an optical fiber **104**. The lens **102** has a convex region **106** that refracts light coming out of the optical fiber **104** into a collimated or focused beam. The lens **102** has a neck region **108** that connects the convex region **106** to the optical fiber **104**. The diameter of the neck region **108** is larger than the outer diameter of the optical fiber **104**, resulting in the overall diameter of the lensed fiber **100** being greater than the outer diameter of the optical fiber **104**. Hence, the lensed fiber **100** would not be able to fit into a standard glass or ceramic ferrule or groove, such as an etched groove on a silicon chip, designed to hold the optical fiber **104**. Instead, a